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EXAMINER

SAINT SURIN, JACQUES M

ART UNIT PAPER NUMBER

2886

DATE MAILED: 05/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/904,620

Applicant(s)

FJELD ET AL

Examiner

Jacques M Saint-Surin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on 8/26/02, 12/17/01, 01/09/02 and 07/13/01
- 2a) ☐ This action is **FINAL**      2b) ☐ This action is non-final
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213

## Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12-17 is/are allowed.
- 6) ☒ Claim(s) 1-11, 18 and 21-24 is/are rejected.
- 7) ☒ Claim(s) 19 and 20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)      4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5,6      6) ☐ Other

## DETAILED ACTION

### *Specification*

1. The specification needs to be updated on page 7, lines 10-18 with regards to the copending applications recited therein.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 5-7, 9-11, 18, 21 and 23-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Kozuka et al. (US Patent 6,055,859).

Regarding claim 1, Kozuka et al. ('859) discloses an ultrasonic emitter (ultrasound transducer 16, see: Figs.1, 2(a) and 2(b)) comprising a resonant unit including an active element (transducer plate 30) having a front surface (32) facing in a forward direction and having a rear surface (36) facing in a rearward direction (the ultrasound transducer 16 comprises a rectangular transducer plate 30 formed of a piezoelectric ceramic material or the like, see: col. 5, lines 60-62) said active element (30) being operative to generate ultrasonic vibrations in response to an applied signal (on the side of the transducer plate 30 on which the reverse surface electrode 36 is formed, connecting leads 38a and 38b are connected to one end of the electrode strips 34 and surface electrode 32 in order to allow a voltage from an external source

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to be applied to the electrodes, see: col. 6, lines 4-8), said resonant unit (reflector 18, see Fig. 1) including a liquid (reflector 18 disposed in the tank 14 filled with a liquid medium 12, see: col. 5, lines 50-51) disposed to the rear of said active element (30), said resonant unit being resonant at an ultrasonic frequency and adapted to emit ultrasonic vibrations at said ultrasonic frequency principally in said forward direction (the ultrasound transducer 16 has a prescribed resonant frequency that is determined by such factors as the shape and material of the transducer plate 30, it is preferable that this resonant frequency be within applied ultrasonic frequency range described below, since, assuming the voltage applied is the same, a radiated ultrasonic frequency that is considerably different from the resonant frequency will result in a major decrease in the ultrasonic intensity, see: col. 6, lines 17-24).

Regarding claim 2, Kozuka et al. ('859) discloses an ultrasonic emitter (transducer 16, see: Fig. 1) comprising:

an active element (transducer plate 30 having front (surface electrode 32) and rear surfaces (reverse surface electrode 36), said active element (30) being operative to generate ultrasonic vibrations in response to an applied signal (at the part where the electrode strip or strips are subjected to the alternating voltage, the transducer plate 30 is driven at a prescribed frequency, radiating ultrasound into the liquid medium 12 at a prescribed frequency, see: col. 6, lines 12-16);

a rear structure defining a space disposed to the rear of said active element (the reflector 18 is disposed in the tank 14 above the transducer 16 from which the reflector

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18 is spaced apart by a prescribed distance with the reflecting surface of the reflector 18 arranged to be parallel to the first principal surface of the transducer 16, so that the reflector 18 reflects ultrasound radiated by the ultrasound transducer 16, the reflector 18 may be constituted as a flat plate of a ceramic material or the like, see: col. 6, lines 29-36); and

a liquid (12) in said space, said element (30), said rear structure (16) and said liquid (12) cooperatively forming a resonant unit, said resonant unit including a backing interface said element, said liquid being disposed between said backing interface and said rear surface of said active element (30) (Silicon rubber was used to attach an ultrasound transducer 16 as shown in FIG. 2 to the bottom arm of a U-shaped fixing bracket, a flat, reflector plate 18 formed of piezoelectric ceramic material was attached to the top arm of the bracket, 30 mm away from the transducer 16 and the bracket with the attached transducer and reflector was then placed in a tank 14 filled with water as the liquid medium, see: col. 5, lines 62-67 and col. 10, line 1.

Regarding claim 3, as discussed above, it is rejected for the reasons set forth for claim 2. Furthermore, with regards to the liquid at least partially defining said backing interface, Kozuka discloses this ensures that conditions for resonance between the ultrasound transducer 16 and the reflector 18 are satisfied and holds down attenuation of standing wave field energy in the liquid medium 12, thereby enabling stable trapping of micro particles with less electrical power, see: col. 7, lines 36-40).

Regarding claims 5-7, Kozuka discloses any micro particles may be used that have an impedance that is different from that of the liquid medium and reflect or

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absorb ultrasonic waves, after the micro particles to be manipulated have been dispersed in the liquid medium 12, the switch 20 is operated under the control of the personal computer 26 to select one or multiple electrode strips 34 to receive a voltage, and the function generator 24 is used to generate an alternating voltage at a prescribed frequency, see: col. 7, lines 63-67 and col. 8, lines 1-4.

Regarding claims 9-11, Kozuka discloses transducer plate 30 formed of a piezoelectric ceramic metal or the like, the ultrasound transducer 16 comprises a rectangular transducer plate 30 formed of a piezoelectric ceramic material or the like, a surface electrode 32 that wholly covers a first principal surface of the transducer plate 30 and also wraps around one end of the transducer plate 30 to cover an edge face and part of a second principal surface of the transducer plate 30 in the vicinity of the edge face, and a reverse surface electrode 36 on the second principal surface of the transducer plate 30, the reverse surface electrode 36 being constituted as a plurality of separate, short electrode strips 34 arranged in parallel. see: col. 5, lines 60-67 and col. 6, lines 1-4.

Regarding claim 18, it is a method claim that recites the steps performing the functions of the apparatus of claim 1. Therefore, it is rejected for the reasons set forth for that claim.

Regarding claim 21, Kozuka et al. discloses wherein said resonant unit (16) includes a reflective backing interface said liquid (12) being disposed between said reflective backing interface (18) and said rear surface 36) of said active element (30). Furthermore, Kozuka discloses silicon rubber was used to attach an ultrasound

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transducer 16 as shown in FIG. 2 to the bottom arm of a U-shaped fixing bracket, a flat, reflector plate 18 formed of piezoelectric ceramic material was attached to the top arm of the bracket, 30 mm away from the transducer 16 and the bracket with the attached transducer and reflector was then placed in a tank 14 filled with water as the liquid medium, see: col. 5, lines 62-67 and col. 10, line1.

Regarding claim 23, Kozuka discloses this ensures that conditions for resonance between the ultrasound transducer 16 and the reflector 18 are satisfied and holds down attenuation of standing wave field energy in the liquid medium 12, thereby enabling stable trapping of micro particles with less electrical power, see: col. 7, lines 36-40).

Regarding claim 24, it is a method claim that recites the steps performing the functions of the apparatus of claim 1. Therefore, it is rejected for the reasons set forth for that claim.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

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were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 4, 8 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kozuka et al. (US Patent 6,055,859) in view of Axelsson (US Patent 6,282,949).

Claim 4 differs from Kozuka by reciting a source of liquid communicating with said space and an outlet communicating with said space, said source being operative to move said liquid through said space. Axelsson discloses a housing or cell body 1 provided with a liquid through-passage 2 with an inlet and an outlet 2a, 2b (FIG. 3) designed to be connected to the liquid flow system in question, see: col. 3, lines 43-46). It would have been obvious to one having ordinary skill in the art at the time of the invention to utilize in Kozuka the techniques of Axelsson because it would provide a liquid passage that dominates the area that the emitted ultrasound passes through the cell results in that a great and reliable difference between the respective sound intensities detected for liquid and gas, usually air, is obtained thereby, causing in turn that the electronic circuit that is necessary for driving the detector cell may be made very small thereby making the above combination very robust and useful.

Claims 8 and 22 differ from Kozuka by reciting the medium is a gas. Axelsson discloses the bubble detection apparatus shown in FIGS. 1 to 3 is primarily intended to be used for the detection of air/liquid in passages for liquid chromatography, but it may,



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of course, also be used in other applications where gas bubbles or other inhomogeneities in the liquid flow are to be detected, see: col. 3, lines 38-42. It would have been obvious to one having ordinary skill in the art at the time of the invention to employ in Kozuka the techniques of Axelsson because it would provide a robust unit which is suitable for small liquid passage dimensions and thereby giving a reliable detection of air bubbles in an efficient manner.

***Allowable Subject Matter***

6. Claims 12- 17 are allowable over the prior art of record.
7. Claims 19-20 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
8. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record taken alone and in combination does not disclose an ultrasonic emitter comprising a tubular piezoelectric element having an interior bore, an inner surface bounding said bore and an outer surface, an interior structure extending within said bore, said interior structure including a first tube substantially coaxial with said tubular piezoelectric element so that said first tube and said piezoelectric element cooperatively define an annular passageway therebetween, a gas disposed within said first tube; and (d) means for connecting the annular passageway to a source of a liquid.

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**Conclusion**

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacques M Saint-Surin whose telephone number is (703) 308-3698. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on (703) 305-4705. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 0956.

  
Jacques M. Saint-Surin  
April 29, 2003

HELEN KWOK  
PRIMARY EXAMINER

